



October 10, 2017

Michael Kulesza – Chairman
Town of Norfolk – Zoning Board of Appeals (ZBA)
One Liberty Lane
Norfolk, MA 02056

Re: Norfolk, MA – The Preserve at Abbyville/Abbyville Commons
Comprehensive Plan – Construction Traffic Review

Dear Mr. Kulesza:

As requested, BETA Group, Inc. (BETA) has completed a review of documents related to construction truck traffic associated with the referenced project, based on the following materials:

- Letter from Michael Guidice to the Zoning Board of Appeals dated July 31, 2017
- Letter from Michael Guidice to the Zoning Board of Appeals dated August 17, 2017
- Letter from Michael Guidice to the Zoning Board of Appeals dated September 28, 2017
- Supplement for Earth Removal submitted by the Applicant, not dated.
- Proposed Phasing Schedule submitted by the Applicant, not dated.
- Proposed Phasing Plan submitted by the Applicant, not dated.

The issue of construction truck traffic and its potential impacts has been discussed at several Board meetings. The Applicant has provided estimates of earthwork quantities, as well as, a phasing plan and schedule for completing the construction. The phasing plan includes seven (7) phases of construction.

Mr. Guidice has provided the Board with an evaluation of the Applicant's submitted information.

The following provides the estimated earthwork quantities provided by the Applicant:

- Total Excavation 1,468,300 CY
- Total Fill 140,757 CY
- Surplus Excavation 1,327,453 CY

The Applicant has stated that the trucks used to transport material off-site will have a capacity of between 25 cubic yards and 28 cubic yards per truck. This is an average of 26.5 cubic yards per truck. This equates to a total of 50,096 truckloads required to remove the surplus excavation over the duration of construction.

Additionally, it is important to evaluate the total truck trips that will be added to existing traffic on Lawrence Street during construction. For this evaluation, one (1) truck load is equal to two (2) truck trips. This equates to a total of 100,192 truck trips required to remove the surplus excavation over the course of construction.

The Applicant's Supplement for Earth Removal includes an evaluation of the percentage increase in Average Daily Traffic (ADT) resulting from the average truck trips per day over the duration of construction. This evaluation utilizes a total duration of between 5.5 years and 9 years with 250 working days per year.

9 YEAR DURATION

Average truck trips/per day = $50,096 \text{ truckloads} / (9 \text{ years} \times 250 \text{ days/year}) = 22.3 \text{ truckloads/day}$
= $22.3 \text{ truckloads/day} \times 2 \text{ truck trips/truckload} = 44.6 \text{ truck trips/day}$

Existing ADT (Lawrence Street) = 865 veh/day
New ADT (Lawrence Street) = $865 + 44.6 = 909.6 \text{ veh/day}$
Increase (%) = $(909.6 - 865) / 865 = 5.2\%$

5.5 YEAR DURATION

Average truck trips/per day = $50,096 \text{ truckloads} / (5.5 \text{ years} \times 250 \text{ days/year}) = 36.4 \text{ truckloads/day}$
= $36.4 \text{ truckloads/day} \times 2 \text{ truck trips/truckload} = 72.8 \text{ truck trips/day}$

Existing ADT (Lawrence Street) = 865 veh/day
New ADT (Lawrence Street) = $865 + 72.8 = 937.8 \text{ veh/day}$
Increase (%) = $(937.8 - 865) / 865 = 8.4\%$

These percentage increases are consistent with the Applicant's information.

The Applicant also provided a Phasing Schedule that developed Estimated Daily Truck Trips for Earth Removal (EDTTER). A review of this chart shows that, based on the timelines provided, the EDTTER does not accurately depict total truck trips.

Mr. Guidice correctly notes in his letters that there is an inconsistency between the timelines presented and the EDTTER. He presents data that more accurately depicts one (1) truckload as being equal to two (2) truckloads. However, it appears that in Mr. Guidice's analysis the truck trips are estimated using the total excavation rather than the surplus excavation (total excavation – fill required) to be removed from the site. This will over estimate the truck trips, though not significantly. The following table presents BETA's evaluation of anticipated average daily truck trips based on the volume of material to be removed, a 26.5 average capacity per truck and the timelines presented by the Applicant.

ESTIMATED AVERAGE DAILY TRUCK TRIPS w/ No Overlap

Phase	Excavation (CY)	Fill (CY)	Surplus Excavation (CY)	CY/Truck	Total Truckloads	Duration (mths)		Truckloads/Day		Truck Trips/Day	
						Short	Long	Short	Long	Short	Long
1	338,016	13,704	324,312	26.5	12,238	18	24	32	24	65	49
2	285,214	31,600	253,614	26.5	9,570	18	24	25	19	51	38
3	220,228	10,133	210,095	26.5	7,928	12	18	31	21	63	42
4	199,653	29,417	170,236	26.5	6,424	12	18	25	17	51	34
5	212,808	38,186	174,622	26.5	6,590	18	24	17	13	35	26
6	201,381	17,717	183,664	26.5	6,931	12	18	28	18	55	37
7	11,000	0	11,000	26.5	415	12	18	2	1	3	2
TOTAL	1,468,300	140,757	1,327,543	26.5	50,096	102	144	Months			
						Total Duration		8.5	12	Years	

1. Truck Trips per Day based on 21 working days per month

As shown in the table, Phase 1 will have the greatest number of average daily truck trips. The Applicant has noted that there may be a 6 month overlap between phases. This reduces the overall duration of the construction, but increases the number of truck trips during the 6 month overlap. The following table presents estimated average daily truck trips applying the 6 month overlap.

ESTIMATED AVERAGE DAILY TRUCK TRIPS w/ 6 Month Overlap

Phase	Excavation (CY)	Fill (CY)	Surplus Excavation (CY)	CY/Truck	Total Truckloads	Duration (mths)		Truckloads W/ 6 mth overlap		Truck trips W/ 6 mth overlap	
						Short	Long	Short	Long	Short	Long
1	338,016	13,704	324,312	26.5	12,238	18	24	41	29	82	58
2	285,214	31,600	253,614	26.5	9,570	18	24	36	24	72	48
3	220,228	10,133	210,095	26.5	7,928	12	18	44	27	88	53
4	199,653	29,417	170,236	26.5	6,424	12	18	34	21	68	43
5	212,808	38,186	174,622	26.5	6,590	18	24	27	18	53	35
6	201,381	17,717	183,664	26.5	6,931	12	18	28	19	56	37
7	11,000	0	11,000	26.5	415	12	18	N/A	N/A	N/A	N/A
TOTAL	1,468,300	140,757	1,327,543	26.5	50,096	102	144	Months			
						Total Duration w/ Overlap		5.5	9	Years	

1. Truck Trips per Day based on 21 working days per month





As shown in the table, when applying the 6 month overlap Phase 3 has the greatest number of average daily truck trips.

The following tables distribute the estimated truck trips per six month periods. This provides an evaluation of the maximum anticipated daily truck trips during each six month period. The tables also includes the frequency of trucks.

ESTIMATED MAXIMUM DAILY TRUCK TRIPS W/6 MONTH OVERLAP – SHORT DURATION SCHEDULE

Phase	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6	
1	8159	8159	8159									
2			6380	6380	6380							
3					7928	7928						
4						6424	6424					
5							4393	4393	4393			
6									6931	6931		
7										415	415	
Total Truck Trips	8159	8159	14539	6380	14308	14352	10817	4393	11324	7346	415	
Trucks Trips/Day	65	65	116	51	114	115	87	35	91	59	3	
Frequency Minutes/Truck	7.4	7.4	4.1	9.4	4.2	4.2	5.5	13.7	5.3	8.2	144.5	

2. Truck Trips per Day based on 21 working days per month
3. Frequency based on an 8 hour work day

ESTIMATED MAXIMUM DAILY TRUCK TRIPS W/6 MONTH OVERLAP – LONG DURATION SCHEDULE

Phase	Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8			
1	6119	6119	6119	6119														
2				4785	4785	4785	4785											
3							5285	5285	5285									
4									4283	4283	4283							
5											3295	3295	3295	3295				
6													4620	4620	4620			
7															277	277	277	277
Total Truck Trips	6119	6119	6119	10904	4785	4785	10071	5285	9568	4283	7577	3295	3295	7915	4620	4897	277	277
Truck Trips/Day	49	49	49	87	38	38	81	42	77	34	61	26	26	63	37	39	2	2
Frequency Minutes/Truck	9.8	9.8	9.8	5.5	12.5	12.5	6.0	11.4	6.3	14.0	7.9	18.2	18.2	7.6	13.0	12.3	216.8	216.8

1. Truck Trips per Day based on 21 working days per month
2. Frequency based on an 8 hour work day

Based on the preceding tables, the maximum daily truck trips range from 87 trips/day for the long duration schedule to 116 trips/day for the short duration schedule. This equates to a frequency of one truck per 5.5 minutes for the long duration schedule and one truck per 4.1 minutes for the short duration schedule.

A review of the documents submitted by the Applicant and Mr. Guidice indicate that both evaluations are using the same data regarding the volume of material to be removed from the site and are in general agreement about the total number of truckloads required to remove the material during the duration of the construction. The Applicant’s assessment of the overall percentage increase in average daily traffic on





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Lawrence Street as the result of the construction is accurate and properly utilizes average truck trips. The Applicant's breakdown of truck trips per phase under reports the average daily truck trips and may be accounting only for truckloads.

Mr. Guidice's evaluation more accurately depicts daily truck trips per phase and maximum daily truck trips based on a 6 month overlap between phases. However, in some cases these estimates appear high.

We offer the following summary based on our analysis.

Percentage increase in ADT – 5.0% to 8.4%
Maximum average daily truck trips – 58 -88 trips/day (assumes 6 month overlap)
Highest daily truck trips (maximum month) – 87 - 116 trips/day
Maximum frequency – 4.1 – 5.5 minutes/truck

Concerns have been expressed regarding two vehicles passing in opposite directions on the causeway given its limited width and lack of shoulders. While this is a legitimate concern, it is likely that given the existing traffic volumes there will be sufficient gaps in the traffic to allow trucks to cross the causeway without opposing traffic.

The Applicant has provided anticipated hours of operation from 7:00 AM to 5:00 PM Monday through Friday. Based on the anticipated volume of construction truck traffic and if the project is approved, the Board should assess whether these hours are appropriate or whether further restrictions are warranted.

If you have questions about any of the preceding, please feel free to contact me at (401) 333-2382. Thank you for the opportunity to participate in this significant project.

Very truly yours,
BETA Group, Inc.

A handwritten signature in dark ink, appearing to read "William P. McGrath", is written over a light-colored rectangular background.

William P. McGrath, P.E.
Associate

cc: Amy Brady – Norfolk Zoning Clerk